

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)	
)	
Review of the Spectrum Sharing Plan)	IB Docket No. 02-364
Among Non-Geostationary Satellite Orbit)	
Mobile Satellite Service Systems in the)	
1.6/2.4 GHz Bands)	
_____)	

COMMENTS OF GLOBALSTAR LLC

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SUMMARY

Globalstar LLC is filing these comments on the Further NPRM in this docket urging the Commission not to require additional sharing in the 1610-1626.5 MHz band for Big LEO Mobile-Satellite Service (“MSS”) systems. The Commission has already required that CDMA and TDMA Big LEO systems coordinate usage of the 1618.25-1621.35 MHz band. The record in this proceeding does not support even that amount of L-band sharing and certainly does not support additional sharing in the 1616-1618.25 MHz band.

After petitioning for increased spectrum access to serve subscribers, Iridium Satellite was unable to demonstrate a need for more spectrum in the United States. The Commission itself found that any increased demand for Iridium services was sporadic and geographically-based. Accordingly, the factual record does not support providing the Iridium system with access to additional L-band spectrum.

On the other hand, Globalstar has demonstrated that it needs access to at least two unshared channels above 1616 MHz to continue to provide critical infrastructure services, aviation services and an Ancillary Terrestrial Component (“ATC”). Critical infrastructure customers demand access to spectrum that will be available at all times. Leaving Globalstar with no unencumbered spectrum threatens its ability to provide such commitments.

Globalstar’s aviation products must meet Federal Aviation Administration and RTCA, Inc., standards, and to meet these standards the products must transmit above 1616 MHz. Globalstar cannot meet these standards and share the

spectrum with Iridium as well. Because Globalstar needs about 5 MHz to implement ATC, plus some spectrum for MSS-only, eliminating all unshared MSS L-band spectrum above 1616 MHz would make it impossible for Globalstar to implement ATC. Accordingly, Globalstar and the U.S. public would be adversely affected if the Commission requires sharing in the 1616-1618.25 MHz band.

The Commission's policy considerations for Big LEO spectrum sharing do not support additional L-band sharing. The Commission decided to require L-band sharing to promote what it termed "spectral efficiency," that is, "increasing the number of licensees that will use this spectrum." If the Commission's rationale for requiring the CDMA and TDMA systems to share spectrum, then the only consistent course of action is to grant the CDMA system shared access to the 1621.35-1626.5 MHz band to which Iridium currently has exclusive access. The Commission cannot justify eliminating Globalstar's access to all unshared spectrum on grounds of spectral efficiency while leaving Iridium's access to unencumbered spectrum intact.

The Commission also described L-band sharing as "technology neutral." But, in fact, sharing the entire 1616-1621.35 MHz band provides Globalstar with no access to unencumbered spectrum while Iridium retains access to 5.15 MHz of unencumbered spectrum. Accordingly, this proposal does not account for the differences in encumbrances of the L-band segments nor does it account for the differences in how CDMA and TDMA systems use spectrum. Additional changes to

the CDMA L-band spectrum would violate the Commission's own stated principles of why the July 2004 L-band plan serves the public interest.

In any event, Iridium has never demonstrated a need for additional spectrum, the premise of this proceeding. Iridium's request for additional spectrum was nothing more than an effort to make it more difficult for Globalstar to compete in the MSS marketplace. The Commission may not now adopt additional L-band sharing because the record in this docket does not support "rebalancing" the L-band spectrum at all.

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COMMENTS OF GLOBALSTAR LLC

Pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. § 1.415), Globalstar LLC ("GLLC") submits the following comments on the Further Notice of Proposed Rulemaking ("Further NPRM") in IB Docket No. 02-364.¹

GLLC owns and operates the international Mobile-Satellite Service ("MSS") business offered through the Globalstar™ non-geostationary satellite constellation in the 1.6/2.4 GHz bands.² Currently, Globalstar service is available in over 120 countries globally. Globalstar offers a variety of voice, fax and data services, and, with over 120,000 subscribers, is the most widely used MSS network in the world.

¹ See Report and Order, Fourth Report and Order and Further Notice of Proposed Rulemaking, FCC 04-134 (released July 16, 2004) ("L-Band Order"). The Further NPRM was published at 69 Fed. Reg. 48192 (Aug. 9, 2004).

² See Loral/Qualcomm Partnership, L.P., 10 FCC Rcd 2333 (Int'l Bur. 1995) (1.6/2.4 GHz user links); L/Q Licensee, Inc., 11 FCC Rcd 16410 (Int'l Bur. 1996) (5/7 GHz feeder links). The Globalstar satellite constellation license was assigned to Globalstar LLC by L/Q Licensee, Inc. See Public Notice, DA 04-628 (released Mar. 8, 2004).

The number of Globalstar's U.S. subscribers has continued to grow dramatically in 2004 as it has for the prior three years, with increases of approximately 10,000 new subscribers in each of the last two four quarter periods of July through June. The increase in Globalstar subscribers in the U.S. and globally demonstrates the efforts of Globalstar to find and serve niche MSS markets and the public's recognition of the variety of uses for MSS services and of the ability of MSS to provide telecommunications services in underserved and otherwise unserved areas. The growth of the Globalstar business and the availability of Globalstar services depends upon the system having access to sufficient spectrum to offer this robust and competitive service.

Background

In the L-Band Order, the Commission decided to modify the existing Big LEO MSS band plan,³ and ordered that the operational Big LEO MSS systems, Globalstar using CDMA and Iridium using TDMA access technology, should share use of the 1618.25-1621.35 MHz band for both systems' uplinks and Iridium's secondary downlinks. Since 1994, Iridium has had exclusive access to the 1621.35-1626.5 MHz band for both its uplinks and downlinks, and Globalstar has had access to the 1610-1621.35 MHz band for its uplinks and the 2483.5-2500 MHz band for its

³ See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, 9 FCC Rcd 5934 (1994) ("Big LEO Rules Order"), modified on recon., 11 FCC Rcd 12861 (1996).

downlinks. Originally, Globalstar was required to operate in the L-band and S-band on a shared basis with three other licensed CDMA MSS systems.

Noting that only the Globalstar CDMA system had become operational since 1994, the Commission decided that spectrum sharing between Globalstar and Iridium would promote “spectral efficiency by increasing the number of licensees that will use this spectrum, particularly at a time when the demand for spectrum has increased.” (L-Band Order, ¶ 45.) The Commission, however, rejected Iridium’s request for additional *exclusive* spectrum because Iridium had simply not made the case that its petition for additional spectrum was premised on anything more than “a sporadic and geographically-based need.”⁴ (L-Band Order, ¶ 47.)

Despite Iridium’s failure to present evidence that its U.S. business is hampered by a shortage of spectrum, the Commission acceded to Iridium’s demand for access to the 1618.25-1621.35 MHz portion of the band. To compound its error, again in the absence of even a colorable factual predicate, the Commission asked in the Further NPRM whether it is feasible for Globalstar and Iridium to share 2.25 MHz more spectrum, from 1616-1618.25 MHz. (L-Band Order, ¶¶ 99-100.) The Commission recognizes that sharing additional L-band spectrum may adversely affect the Globalstar system, either in the provision of aviation services, an

⁴ See Iridium Satellite LLC, Petition for Rulemaking, IB Dkt. 01-185 (filed July 26, 2002).

Ancillary Terrestrial Component (“ATC”),⁵ and/or international services because of existing impediments to unfettered use of the 1610-1616 MHz band in the U.S. and globally. (L-Band Order, ¶ 99.) The Commission seeks comment only on the vague notion of whether sharing additional spectrum would promote some as-yet undefined public interest in spectral efficiency within the L-band. (L-Band Order, ¶ 100.)

In these comments, GLLC demonstrates that sharing the 1616-1618.25 MHz band would adversely affect the Globalstar system and preclude the delivery to the U.S. public of planned and currently available services. Granting Iridium shared access to the 1616-1618.25 MHz band also flatly contradicts the policy considerations on which the Commission relied to modify the Big LEO L-band plan and is utterly unjustifiable based on the record thus far in this proceeding. Accordingly, the Commission may not require the CDMA and TDMA Big LEO MSS systems to share additional L-band spectrum.⁶

⁵ See Flexibility for Delivery of Communications By Mobile Satellite Service Providers in the 2 GHz Band, L-Band, and the 1.6/2.4 GHz Band, 18 FCC Rcd 1962 (2003) (“ATC Order”).

⁶ GLLC is concurrently filing a Petition for Reconsideration of the L-Band Order, and raises issues that should result in modification of the rule adopted for the 1618.25-1621.35 MHz band. The Commission should not consider any action to implement the proposals in the Further NPRM until it has resolved GLLC’s Petition for Reconsideration.

I. GLOBALSTAR NEEDS UNENCUMBERED ACCESS TO SPECTRUM ABOVE 1616 MHZ TO CONTINUE TO PROVIDE SPECIALIZED SERVICES TO IMPORTANT GOVERNMENTAL AND COMMERCIAL SUBSCRIBERS IN THE U.S.

As the Commission recognized in adopting the original Big LEO band plan in 1994,⁷ and again in the L-Band Order (§§ 48-49, 51-52), and as thoroughly detailed in Globalstar's Comments,⁸ the inter-service sharing requirements imposed upon CDMA systems, specifically with respect to the Global Navigation Satellite Systems ("GNSS") and Radio-Astronomy Service ("RAS"), seriously encumber the lower portion of the CDMA L-band (*i.e.*, 1610-1616 MHz) relative to the higher portion (*i.e.*, 1616-1621.35 MHz) and the entire TDMA band (1621.35-1626.5 MHz). These encumbrances have remained problematic since 1994 and are unlikely to improve in the future.

In addition, the National Telecommunications and Information Administration ("NTIA") has proposed more stringent GNSS protection requirements applicable to ATC stations.⁹ And the RAS community remains acutely concerned with out-of-band emissions from MSS systems operating in the Big LEO L-band.¹⁰ Therefore, as the Commission acknowledged in the L-Band

⁷ See Big LEO Rules Order, 9 FCC Rcd at 5960; 47 C.F.R. §§ 25.213(a), 25.216.

⁸ See Joint Comments of L/Q Licensee, Inc., Globalstar, L.P., and Globalstar U.S.A. LLC, at 10-12 (filed July 11, 2003).

⁹ See NTIA Letter, IB Dkt. No. 01-185 (dated Nov. 12, 2002) (filed Feb. 10, 2003); ATC Order, 18 FCC Rcd at 2059-60.

¹⁰ See Cornell University Comments, at 6-8 (filed July 14, 2003).

Order, the difficulties in protecting GNSS and RAS between 1610 and 1616 MHz, detailed by the Big LEO Negotiated Rulemaking Committee in 1993 remain in place today.

Given these existing inter-service restrictions on CDMA operations, the Commission's proposal to eliminate all unencumbered CDMA spectrum by requiring sharing with TDMA systems in the entire 1616-1621.35 MHz is unjustifiable and potentially catastrophic to Globalstar's business. Sharing would unfairly and arbitrarily limit the ability of Globalstar and any future CDMA system to provide a range of niche services and to achieve the capacity necessary to sustain and grow its business and to continue to provide the valuable telecommunications services which only MSS systems can provide.

As the Commission acknowledges (L-Band Order, ¶ 53), sharing L-band spectrum will require Globalstar and Iridium to coordinate. Globalstar and Iridium have been able to "jointly use," coordinate being something of a misnomer, CDMA Channels 8 and 9 in the Middle East pursuant to Iridium's Special Temporary Authority (L-Band Order, ¶¶ 28-29) because neither system is operating at full capacity (see Tech. App., § 2). In point of fact, Globalstar accommodated Iridium by discontinuing use of those channels in the Middle East region when the Commission found, solely based on the representation of Defense Information Systems Agency ("DISA"), that Iridium needed the additional spectrum to serve the U.S. military during a crisis.

As demand increases over time under normal growth scenarios, Iridium's L-band operations will start to interfere with Globalstar's in the same channel (see Tech. App., § 2). Perhaps, unfortunately, neither system is currently designed to use cognitive radio techniques to coordinate operations in the manner suggested by the Commission (L-Band Order, ¶ 45), and the ability to use such technology is at least several years into the future (see Tech. App., § 3).¹¹ Accordingly, sharing 1616-1621.35 MHz between Globalstar and Iridium is not easily accomplished.

Globalstar requires access to unencumbered spectrum in the CDMA band segment in order to provide aviation and other non-voice services and to maintain the quality and level of service generally.¹²

Service Quality and Critical Infrastructure Customers. Globalstar needs access to unencumbered L-band spectrum to ensure that it can provide the quality of service demanded and needed by certain users. For example, Globalstar recently provided satellite phones and airtime to the Federal Emergency Management Agency ("FEMA") to assist in relief efforts in Florida following Hurricanes Charley

¹¹ The Commission has thus misplaced reliance on the availability of cognitive radio techniques to facilitate coordination of the L-band spectrum. Sharing in the Big LEO L-band through cognitive radio techniques cannot be implemented at this time. Accordingly, the Commission should abandon the proposals in the Further NPRM at least until such time as these techniques are available to the Big LEO MSS systems.

¹² In some countries, e.g., France and Russia, Globalstar has access to spectrum only above 1613.8 MHz. If these countries were to follow the Commission's lead in requiring spectrum-sharing between Globalstar and Iridium, Globalstar would have even more difficulty providing services, such as aviation services, that inherently cross international boundaries.

and Frances. These services were offered to emergency workers and citizens in areas devastated by the hurricanes. Such phones can make a real difference in achieving progress in such emergencies, but they are of little use if the service provider cannot guarantee that service will be uninterrupted.

As the Commission is well aware, MSS can provide telecommunications services where landline and terrestrial wireless services have been disrupted, or where terrestrial services are non-existent. However, public safety and first response organizations need robust communications systems that are unlikely to suffer from degradation or interruption because of interference from other services. Indeed, some government agencies may demand a level of uninterruptible services as a condition of contracting.

In order to guarantee service to such customers, Globalstar needs access to spectrum that it knows will be unencumbered by other operating stations and services. Requiring Globalstar to share all its available L-band spectrum with other services would make it more difficult, if not impossible, for Globalstar to provide the quality and level of service required by critical infrastructure services. It would not serve the public interest for the Commission to take away the ability of Globalstar to serve these critical infrastructure needs.

Aviation Services. Globalstar's aviation service is the primary reason why it needs unencumbered channels above 1616 MHz. Aeronautical MSS is subject to several restrictions on channel usage. The aviation equipment must be built to meet standards set by the Federal Aviation Administration ("FAA") and RTCA, Inc.,

for the protection of GPS and GLONASS (collectively, the GNSS) operating in the 1574-1610 MHz band.¹³ To meet these standards, Globalstar's aviation services in L-band currently operate above 1616 MHz (that is, on L-band Channels 6, 7, 8 and 9).¹⁴ (See Tech. App., § 1.)

The FAA/RTCA requirements applicable to the delivery of Globalstar aviation services restrict in-band and out-of-band transmissions. The restriction on in-band power limits the power that can be transmitted across the entire MSS L-band ("Maximum Total Transceiver Power"). The restriction on the transmitting power level of the AMSS terminal below 1614.0 MHz makes it impossible for Globalstar to operate its aviation product below 1614 MHz. The out-of-band emissions standard, again for transmissions across the entire L-band, starts at 1613.8 MHz.

The Minimum Operational Performance Standards for AMSS systems adopted by RTCA in its RTCA Document 228 include a restriction on harmful interference into GPS. This restriction rises linearly from 1585.0 MHz to 1626.5 MHz. To meet this requirement, Globalstar had to design its aviation terminals to operate above 1616 MHz.¹⁵ Globalstar AMSS terminals incorporate state-of-the-art

¹³ See RTCA, Inc., "Minimal Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)," RTCA/DO-262 (Dec. 14, 2000).

¹⁴ See Globalstar LLC, Ex Parte Letter (filed June 3, 2004).

¹⁵ RTCA DO-228 includes two sets of requirements, one for GPS and one for GPS and GLONASS. The Globalstar aviation terminals were designed to meet the
(continued...)

filter technology to meet the FAA/RTCA standards. These filters are large and relatively expensive, and cannot be improved at this time. (See Tech. App., § 1.)

Globalstar aviation service is currently operational, and continues to grow at a significant rate, 680 percent from the first quarter of 2003 to the first quarter of 2004. Globalstar is in discussions with several international air carriers to provide this service, each of which individually represents a large market segment. Moreover, several U.S. agencies are using Globalstar aviation services now. Based on current and projected traffic, Globalstar needs at least two unencumbered 1.23 MHz channels above 1616 MHz for its aviation service. Were the Commission to limit access to such channels, it would effectively prohibit such uses for the Globalstar system, taking away existing services, squandering millions of dollars in research and development for these products, precluding growth for the system, and harming service to critical government users.

Ancillary Terrestrial Component. In addition to the impact on aviation services, sharing of L-band spectrum down to 1616 MHz would adversely affect Globalstar's ability to implement an ATC. As the Commission recognizes, about 5 MHz is required to effectively deploy a cellular-like terrestrial service because of frequency reuse requirements. Accordingly, a Globalstar ATC would require 5 MHz for implementation. While some of the ATC-designated channels could be used for

(...continued)

GPS-only requirements. Meeting the GPS-GLONASS restrictions would require designs to operate at a frequency higher than 1616 MHz.

MSS in geographically-separated areas, to coordinate the satellite and terrestrial components, Globalstar requires some channels that are not used for ATC to be available for MSS. If Globalstar's non-shared spectrum is limited to 6 MHz (1610-1616 MHz), then there would be only 1 MHz of non-shared spectrum above the 5 MHz needed for ATC, not even the bandwidth of a single Globalstar channel, and not enough spectrum to make implementation of ATC feasible. The Commission intended not to compromise the availability of ATC in connection with its reduction of CDMA spectrum at S-band (L-Band Order, ¶ 72). The reduction of Globalstar's L-band spectrum would effectively eliminate the possibility of ATC nonetheless.

II. GRANTING IRIDIUM ACCESS TO THE 1616-1618.25 MHZ BAND WOULD VIOLATE THE PRINCIPLES OF SPECTRAL EFFICIENCY AND TECHNOLOGY NEUTRALITY ON WHICH THE NEW L-BAND SHARING RULE IS BASED.

The Commission justified revisions to the Big LEO L-band spectrum plan on two principles: spectral efficiency (¶ 45) and technology neutrality (¶ 46). If the Commission increases the TDMA system's access to additional shared spectrum in L-band, it will violate both these principles, and undermine its L-Band Order.

Spectral Efficiency. The Commission has long recognized that the 1610-1616 MHz segment of the Big LEO CDMA band is encumbered by interservice sharing requirements. These sharing requirements impose geographic restrictions and power limits that constrain capacity generally and at times preclude use by individual call transmissions. Since the other services imposing these restrictions are passive, Globalstar, and any other CDMA system, must essentially self-

coordinate transmissions in the 1610-1616 MHz band in order to make maximum use of that spectrum resource.

The Commission also recognizes that “sharing” the 1618.25-1621.35 MHz band between Globalstar and Iridium demands coordination rather than “sharing” in the traditional regulatory sense (L-Band Order, ¶ 53). Globalstar and Iridium cannot operate co-frequency, co-coverage in the way that two CDMA systems can “share” the same frequencies by using Code Division Multiple Access technology. Rather, Globalstar and Iridium must use various coordination techniques, including frequency division and geographic separation, in order to maximize use of the spectrum resource. Iridium’s admitted inability to assign its channels geographically adds to the challenge of coordinating frequency use.

As noted above, Globalstar’s access to *unencumbered* spectrum has been reduced from 5.35 MHz (1616-1621.35 MHz under the 1994 plan) to 2.25 MHz (1616-1618.25 MHz under the July 2004 plan). At the same time, Iridium has retained access to 5.15 MHz of unencumbered spectrum (1621.35-1626.5 MHz under both the 1994 and 2004 plans). As illustrated in Figure 1, if the Commission were to grant Iridium access to the 1616-1618.25 MHz band, then Globalstar’s access to unencumbered spectrum would be reduced to 0 MHz while Iridium’s access to unencumbered spectrum would remain unchanged, at 5.15 MHz.

Figure 1: The Big LEO L-Band

1994

(CDMA) Shared	(CDMA) Unencumbered	(TDMA) Unencumbered
1610	1616	1621.35
		1626.5

July 2004

(CDMA) Shared	(CDMA) Unencumbered	(MSS) Shared	(TDMA) Unencumbered
1610	1616	1618.25	1621.35
			1626.5

Proposed

(CDMA) Shared	(MSS) Shared	(TDMA) Unencumbered
1610	1616	1621.35
		1626.5

The Commission deemed “spectral efficiency” as “increasing the number of licensees that will use this spectrum.” (L-Band Order, ¶ 45.) But if the Commission’s rationale for granting Iridium shared access to the entire 1616-1621.35 MHz band is “spectral efficiency,” then the only rational and consistent course of action is to grant Globalstar shared access to the 1621.35-1626.5 MHz band because that too would increase the number of users of this spectrum. The Commission cannot justify eliminating Globalstar’s access to unencumbered spectrum on grounds of spectral efficiency while leaving Iridium’s access to unencumbered spectrum intact. Such action would make a mockery of the “spectral efficiency” rationale.

Technology Neutrality. The Commission stated in the L-Band Order (¶ 46) its revisions to the Big LEO band plan were justified because the new “spectrum sharing plan represents a more technology neutral approach to assigning spectrum, thereby not giving a preference to a specific technology.”

As explained above, however, under the 1994 Big LEO band plan, both CDMA and TDMA technologies had access to about the same amount of unencumbered spectrum. The new plan halves the unencumbered spectrum available to CDMA systems while maintaining the existing level of unencumbered spectrum available to the TDMA system. Requiring sharing of additional L-band in the manner proposed in the Further NPRM would eliminate access to unencumbered spectrum by CDMA systems while maintaining access to unencumbered L-band spectrum by the TDMA system.

Moreover, the Commission expressly and properly rejected Iridium's suggestion that the L-band spectrum be divided on the basis of "spectrum parity." As the Commission acknowledged, the various segments of the L-band spectrum are not equal in terms of encumbrances, and the CDMA and TDMA systems use the spectrum differently, making a megahertz-by-megahertz comparison impossible.

The proposal to require sharing of the entire 1616-1621.35 MHz cannot in any way be described as "technology neutral" because it does not account for the differences in encumbrances of the L-band segments nor does it account for the differences in how technologies use spectrum. Therefore, any additional change to the CDMA L-band spectrum would violate the Commission's own stated principles of why the July 2004 L-band plan is better than the 1994 plan.

III. THE COMMISSION MAY NOT GRANT IRIDIUM ACCESS TO ADDITIONAL SPECTRUM BECAUSE IT HAS NEVER PROVIDED EVIDENCE OF A NEED FOR MORE SPECTRUM.

In the L-Band NPRM in IB Docket No. 02-364,¹⁶ the Commission stated in no uncertain terms the information that the Commission wanted Iridium to provide to the record in order to justify granting Iridium access to additional spectrum, including:

- “detailed comment regarding [Iridium’s] actual current spectrum use and substantiated projections of its future spectrum requirements”
- “the number of customers Iridium can support using its current spectrum, the demand of Iridium customers for spectrum in the United States versus other regions of the world”

Iridium provided nothing. Indeed, the Commission could only conclude based on the conclusory statements proffered by Iridium that its alleged demand for additional spectrum was premised on nothing more than “a sporadic and geographically-based need.” (L-Band Order, ¶ 47.)

Globalstar did provide to the record substantial information demonstrating that Iridium does not need additional L-band spectrum to support its current and future U.S. subscribers.¹⁷ In granting Iridium access to 3.1 MHz of additional spectrum, the Commission simply chose to avoid Globalstar’s factual showing and

¹⁶ Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, Notice of Proposed Rulemaking, 18 FCC Rcd 1962, 2087, ¶ 267 (2003).

¹⁷ See Joint Reply Comments of L/Q Licensee, Inc., Globalstar, L.P., and Globalstar USA L.L.C. (filed July 25, 2003); Globalstar, L.P., Ex Parte Presentation (filed Mar. 19, 2004).

rely instead on “spectral efficiency” and “technology neutrality.” The finding actually supported by the record is inescapable: *Iridium does not need access to additional spectrum to serve subscribers in the United States now or for the immediate future.*

To grant Iridium access to even more spectrum in response to the Further NPRM would be contrary to the premises of this proceeding and would reward Iridium even though it does not today maximize spectrum efficiency (e.g., by assigning channels geographically) and did not comply with the Commission’s request for data. The Commission may not rely on an unsupported supposition that “rebalancing” is needed in the Big LEO spectrum bands, and must recognize that Iridium’s Petition for additional spectrum was nothing more than an effort to hamper Globalstar’s ability to compete in the MSS marketplace.

IV. CONCLUSION

For the reasons set forth above, the Commission must make *no* further changes to the L-band sharing plan. If it does grant Iridium shared access to the 1616-1618.25 MHz band, then the only equitable step consistent with the policy outlined in the L-Band Order is to grant Globalstar shared access to the 1621.15-1626.5 MHz band.

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TECHNICAL APPENDIX

GLOBALSTAR LLC

TECHNICAL APPENDIX

COMMENTS ON FURTHER NPRM (IB Dkt. No. 02-364)

1. Globalstar Requirements for Unencumbered L-Band Channels

The FCC is considering having the L-band sharing rules between Iridium and Globalstar apply not just in the 1618.25-1621.35 MHz band, but also down to 1616 MHz.

The Globalstar system needs to restrict the frequencies of its aeronautical uplink transmissions to channels above 1616 MHz in order to meet out-of-band ("OOB") emissions limits below 1613.8 MHz imposed by the requirements set forth in RTCA DO-262 and RTCA DO-228.¹ Requiring the entire 1616-1621.35 MHz band to be shared would mean that Globalstar will not have unfettered access to even a single channel for its aviation services. That adversely affects Globalstar's ability to continue to provide its aviation services.

Iridium's claim that "Globalstar could prevent its out of band emissions from interfering in spectrum below 1614 MHz if it employed better filter technology" is baseless.² Globalstar's aviation terminals have been developed in the past year or so and already use state-of-the-art filter technology in order to limit OOB emissions in accordance with the RTCA standards.

2. Coordination Issues Between Globalstar and Iridium

The Commission noted (L-Band Order, ¶¶ 28-29) that Globalstar and Iridium have already shared CDMA L-band Channels 8 and 9 pursuant to Iridium's Special Temporary Authority ("STA") for service in the Middle East. In point of fact, Globalstar voluntarily vacated Channels 8 and 9 in the Middle East while Iridium had its STA. Sharing under the STA was possible only because neither system is operating at full capacity. In the Middle East, where Iridium had high usage, band segmentation was used to coordinate. In areas where Iridium's usage was low, band segmentation was not necessary because the signals

¹ See Globalstar LLC, Ex Parte Letter (June 3, 2004).

² See Iridium, Ex Parte Letter, at 1 (June 2, 2004).

from Iridium's user terminals are sufficiently dispersed and transmitted at sufficiently low cumulative power to avoid causing interference.

While Globalstar is not sure whether other limitations in Iridium's network will allow it to reach the spectral occupancy limit assumed in herein, at a certain level of usage, Iridium transmissions will cause significant interference to Globalstar. Specifically, if Iridium is at capacity and every carrier frequency available to it in a 1.23 MHz Globalstar channel is being used, and assuming that three Iridium beams on average fall into one Globalstar beam, then 88 Iridium carriers are operating in one Globalstar channel. As shown in Table 1, if each Iridium carrier is transmitting at 3 dBW, then the aggregate will cause Globalstar's self-interference and thermal noise density to increase by 15% which is well above the acceptable limit for external interference of 3%.

Similarly Table 2 shows that as Globalstar capacity increases to the point where 40 users are operating in every L-band channel, the Globalstar system will cause interference to Iridium users in the same channel. If Iridium needs a C/I of 18 dB to operate, the Globalstar interference causes it to have a C/I of 8.7 dB, which is likely to be unacceptable to Iridium users.

Table 1: Co-frequency interference from Iridium to Globalstar if both systems are at capacity

Iridium interference into Globalstar

Frequency	1618 MHz
Number of Iridium beams per Globalstar beam	3
Number of Iridium carriers in 1.23 MHz at capacity	88.55291577
Average Iridium transmit power per carrier	3 dBW
Typical range at 40 deg. Elev.	1952 km
Path loss	-162.430937 dB
Interf. density per beam from Iridium users rcvd at Globalstar sat. input	-200.857959 dBW/Hz

At Globalstar satellite

Rcv antenna gain	16 dB
Typical self interference density	-193 dBW/Hz
Typical self interference plus thermal noise density	-192.485031 dBW/Hz
Allowable % degradation due to external interference	3%
Allowable external interf. (for 3% degradation of self-interf.plus noise)	-192.356658
Total interference and noise density	-191.895278 dBW/Hz
Actual degradation in self-interf. plus noise	15%

Table 2: Globalstar co-frequency interference into Iridium operating at capacity with 40 Globalstar users per 1.23 MHz

Globalstar interference into Iridium

Frequency	1618 MHz
Signal BW	41.67 kHz
Assumed number of Globalstar carriers per 1.23 MHz per beam	40
Average Globalstar transmit power per carrier	-10 dBW
Typical range at 40 deg. Elev.	1076.7751 km
Path loss	-157.26384 dB
Typical Iridium user EIRP	0 dBW
<u>At Iridium satellite</u>	
Rcvd carrier power	-157.26384 dBW
Interf. density from Globalstar users rcvd at Iridium sat. input	-212.14229 dBW/Hz
Rcvd Globalstar intert. power in signal BW	-165.94406 dBW
Desired C/I	18 dB
Actual C/I	8.6802162 dB

3. Cognitive Radio for L-Band Sharing with Iridium

The FCC suggests that the increasing evolution towards cognitive radio techniques will enable co-frequency sharing between Globalstar and Iridium. (L-Band Order, ¶ 45.) While cognitive radio technology may be feasible at some distant date, the current Globalstar and Iridium systems are not designed to take cognitive radio into account. In the case of the radio astronomy band, Globalstar handsets do have some level of cognition of the neighboring frequency spectrum; however, they are currently able to do this only for fixed radio astronomy sites. Given that both Globalstar and Iridium are LEO satellite systems, with constantly changing interference geometries, the implementation of such a cognitive radio technique that can successfully be used to allow co-frequency operation of these two particular systems in a given geographic region will require several years to develop at a cost that is currently unknown.

Engineering Certification

I hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing "Technical Appendix"; that I am familiar with the relevant sections of the FCC's Rules, the rules adopted and proposals set forth in the "Report and Order, Fourth Report and Order, and Further Notice of Proposed Rulemaking" (FCC 04-134) in IB Docket No. 02-364 and ET Docket No. 00-258, and the information contained in the foregoing Technical Appendix; and that information in the Technical Appendix is true and correct to the best of my knowledge and belief.

Signed this 7th day of September 2004.



Paul A. Monte
Director, Systems & Regulatory Engineering
Globalstar LLC

CERTIFICATE OF SERVICE

I, William D. Wallace, hereby certify that I have on this 8th day of September, 2004, caused to be served true and correct copies of the foregoing "Comments of Globalstar LLC" upon the following persons via hand delivery:

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Washington, DC 20554

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Federal Communications Commission
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The Honorable Michael Copps
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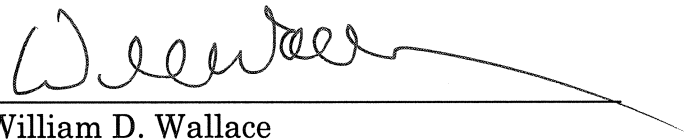
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